DOCUMENT RESUME

ED 063 120 SE 013 644

TITLE Authorized Course of Instruction for the Quinmester Program. Science: The World of Animals, Animal Life, Four Legged and Otherwise.
INSTITUTION Dade County Public Schools, Miami, Fla.
PUB DATE 71
NOTE 79p.

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS *Biology; Ecology; *Instruction; *Objectives; Secondary School Science; *Teaching Guides; Units of Study (Subject Fields)
IDENTIFIERS Quinmester Program

ABSTRACT

This instructional package contains three animal life units developed for the Dade County Florida Quinmester Program. "The World of Animals" is a survey course of the animal kingdom (excluding man) and involves the students in many laboratory investigations and group activities. Typical animals of South Florida and unusual animals of the world are studied. "Animal Life" includes recognition and characteristics of harmful and beneficial animals, natural communities, and energy relationships. "Four Legged and Otherwise" is an elementary course in general zoology with emphasis on the economic value of the fauna of South Florida, ecological relationships, and the effects of pollution. Each booklet includes performance objectives for the unit, lists state-adopted texts, provides a synoptic summary of the course content, suggests activities and projects, indicates audio-visual materials available in the county and from other sources, and recommends reference books. Each booklet contains a chart relating each suggested activity to specific performance objectives. (CP)

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AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION • 1971

THE WORLD OF ANIMALS

5311.17
5312.17
5313.17

SCIENCE
(Experimental)

THE WORLD OF ANIMALS

5311.17

5312.17

5313.17

SCIENCE

(Experimental)

Written by Betty Lou McCollum and
Leonard P. Foster

for the

DIVISION OF INSTRUCTION
Dade County Public Schools
Miami, Florida
1971

Published by the Dade County School Board

Copies of this publication may be obtained through

Textbook Services
2210 S. W. Third Street
Miami, Florida 33135

Price: $.75

TABLE OF CONTENTS

THE WORLD OF ANIMALS

COURSE DESCRIPTION

The World of Animals is a survey course of the animal kingdom (excluding man) that involves the students in many laboratory investigations and group activities. Time will be given to the study of typical animals of South Florida and unusual animals of the world.

ENROLLMENT GUIDELINES

None

STATE ADOPTED TEXTS

1. Brandwein, Burnett, and Stollberg. Life:Its Forms and Changes. New York: Harcourt, Brace and World, 1968.

2. Frazier and Smith, The Biological Sciences. River Forrest, Illinois: Laidlaw Brothers, 1969.

3. Oxenhorn and Idelson. Pathways in Science, Biology, Vols. I, II, III. New York: Globe Book Company, 1968.

4. Thurber and Kilburn. Exploring Life Science. Boston: Allyn and Bacon, Inc., 1966.

PERFORMANCE OBJECTIVES

The student will:

1. Use a microscope according to the proper procedures.

2. Given specimens of one-celled organisms, compare similarities and differences of animal cells, plant cells and protists.

3. Given a diagram of a typical cell, identify the parts of the cell and their functions.

4. Cite examples of the basic processes that are characteristic of all living cells.

5. Given characteristic specimens of invertebrates, describe their characteristics.

6. Examine the adaptations and characteristics of cold-blooded animals.

7. Identify characteristics of warm-blooded animals that make them unique.

8. Gather data on animals that are typical of South Florida.

9. Given data on animals that are typical inhabitants of South Florida, suggest how the change in environmental conditions might affect the preservation of the species.

10. Investigate some animals with unusual characteristics.

11. Discover some milestones in the field of zoology.

COURSE OUTLINE

I. The Living Cell.

- A. Structure
- B. Function

II. Single-celled Organisms.

- A. Euglena
- B. Amoeba
- C. Paramecium

III. Lower Invertebrates.

- A. Sponges
- B. Coelenterates
- C. Flatworms
- D. Roundworms

IV. Higher Invertebrates.

- A. Mollusks
- B. Annelids
- C. Arthropods
- D. Echinoderms

V. Cold-blooded Vertebrates.

- A. Fish
- B. Amphibians
- C. Reptiles

COURSE OUTLINE (CONT'D.)

VI. Warm-blooded Vertebrates

A. Birds

B. Mammals

VII. Typical Animals of Florida.

A. Birds

B. Fish

C. Land animals

VIII. Strange Animals of the World

IX. Some Major Contributions in Zoology

LABORATORY INVESTIGATIONS

Science Lab 7 and 8 Laboratory Activities ITV Teacher's Guide. Dade County Board of Public Instruction, 1966. (These activities are in the 1967 edition of Science Lab: 7 & 8, but the page numbers will be different.)

1. Use of microscope (pp. 177-186)
2. Kinds of cells, Part I (pp. 50-51)
3. Kinds of cells, Part II (p. 52)
4. How can we culture and study some living protozoans? (pp. 88-89)
5. How can we become familiar with some of the structures of two representative metazoans? (hydra and sponge) (pp. 90-91)
6. How can we become familiar with some of the structural characteristics of the worms? (pp. 95-97)
7. How can we study the external structures and features of a typical insect? (pp. 98-99)
8. Collection and identification of insects and other small invertebrates (pp. 103-105); Insect Key (pp. 108-110)

LABORATORY INVESTIGATIONS (CONT'D)

9. Collection and identification of insects (pp. 106-107; Insect Key (pp. 108-110)
10. Temperature and Life (pp. 32-33)
11. How can we examine internal and external structures of a vertebrate animal? (pp. 152-161)
12. Anatomy of a fish - examination of external and internal structures (pp. 111-114).

Thurber and Kilburn, Exploring Life Science. Boston: Allyn and Bacon, Inc., 1966.

13. Variety in a culture (pp. 114-117)
14. Measuring Microscopic Objects (pp. 118-119)
15. Using a Microscope (p. 465)
16. Measuring Oxygen Removed (p. 211).
17. Water Vapor from Insects (p. 214)
18. Production of Carbon Dioxide (p. 212)

Brandwein, Burnett and Stollberg. Life Its Forms and Changes. New York: Harcourt, Brace and World, Inc., 1968.

19. An Apprentice investigation in Paramecium's response to danger (p. 80)
20. Effects of salt water on fresh water life (p. 25)
21. Dissecting a frog (p. 97)
22. Simple diffusion (pp. 187-189)
23. Experiment on the hydra (p. 317)
24. Anatomy of a clam (p. 350)
25. Experiment on a fish (pp. 379-382)

Frazier and Smith, The Biological Sciences. River Forrest, Illinois. Laidlaw Brothers, 1969.

26. The structure of a clam (p. 228)
27. Find out by trying - Life activities of an amoeba (p. 24)
28. Find out by trying - Determine the responsiveness of an amoeba (p. 26)
29. Experiments on Paramecium (p. 130)
30. Tropisms of organisms (p. 223)
31. Earthworms (p. 245)
32. Experiment on fish (p. 270)
33. Pithing a frog (p. 341)

DEMONSTRATIONS

Brandwein, Stollberg, Burnett. Life Its Forms and Changes. Atlanta; Harcourt, Brace and World, Inc., 1968.

1. Development of Chick Embryos (pp. 454-456)
2. A Study in Anatomy: A Bony Fish (pp. 379-384)

Frazier-Smith, The Biological Sciences, Atlanta: Laidlaw, 1969.

3. Water Passage Through Membrane (p. 53)
4. Iodine Solution and Cheek Cells (p. 53)
5. Collecting Water Samples of Aquatic Habitat (p. 130)
6. Peristalsis Demonstration (p. 317)
7. Testing Sensitive Areas of the Tongue (p. 341)

Thurber, Exploring Life Science. Atlanta: Allyn and Bacon, 1967.

8. How Digestion Works (p. 186)
9. Development of Embryos (p. 256)
10. Diffusion Through a Membrane (p. 374)

RESOURCES NEEDED FOR CLASSROOM

1. Peterson, Roger Tory, The Birds, (Life Nature Library) New York: Time Inc., 1963.

2. Farb, Peter, The Insects. (Life Nature Library, New York: Time Inc., 1962.

3. National Geographic Society. Wondrous World of Fishes. Washington, D.C., 1965.

4. Carr, Archie, The Reptiles. (Life Nature Library) New York: Time-Life Books, 1963.

5. Carrington, Richard. The Mammals. New York: Time Inc., 1963.

6. Pfeiffer, John. The Cell (Life Science Library) New York: Time-Life Books, 1964.

RESOURCES NEEDED FOR CLASSROOM (CONT'D)

7. Ommanney, F. D., The Fishes. (Life Nature Library) New York: Time-Life Books, 1963.

8. The Readers' Digest Association. Marvels and Mysteries of Our Animal World. Pleasantville, New York: Readers' Digest, 1964.

9. National Geographic Society. Wild Animals of North America. Washington, D.C.: National Geographic, 1960.

10. Engel, Leonard, The Sea. (Life Nature Library) New York: Time-Life Books, 1961.

PROJECTS

1. Exhibit different types of pesticides sold in the community and make a collection of harmful insects in the community.

2. Make models out of clay which would illustrate the basic shapes of micro-organisms.

3. Make a classroom terrarium.

4. Observe regeneration of planaria.

5. Remove calcium from bones by soaking in vinegar.

6. Develop a display which compares typical life spans of various organisms.

7. Observe metamorphosis of tadpoles to frogs.

8. Build a feeder for the study of birds.

9. Make an insect trap.

PROJECTS (CONT'D)

10. Prepare cultures under different conditions. (hay infusion)

11. Prepare a salt water aquarium.

12. Prepare a fresh water aquarium.

13. Collect shells found on Florida shores.

14. Make charts showing parts of a paramecium or other micro-organisms.

15. Draw diagrams of typical animal cells.

16. Make a poster showing how some typical micro-organisms reproduce.

17. Make models of micro-organisms out of soap.

18. Visit a slaughterhouse or check other sources to collect parts of animals to study: cow eye, heart.

19. Construct a conservation project demonstrating the effect of drought on the Everglades.

20. Construct a project demonstrating the destruction of the mangrove swamps to make room for buildings. What effect would this have on the different species of animals in that community?

21. Make a poster depicting the damage done to the Everglades by fire.

22. Make a study of the bottle-nosed porpoise, and prepare a poster displaying his unusual characteristics.

23. Make a poster of the unusual pouched animals (opossum and kangaroo).

24. Make a poster showing the poisonous snakes of Florida.

SUGGESTED DISCUSSION QUESTIONS

1. Why do snakes and frogs respond so sluggishly to stimuli in cold weather?

2. Why don't mammals breathe inside their mothers?

3. Why are offspring much like their parents?

4. Why is hemoglobin important to warm-blooded animals?

5. How does food digestion in a paramecium differ from food digestion in man?

6. How would life differ on a planet where no carbon atoms existed?

7. What is the difference among saprophytes, scavengers, and parasites?

8. Discuss the stages of insect development.

9. Discuss the organization of the bee society.

10. Is insect classification based upon structure or habits?

11. Why do some animals hibernate? What changes occur in the bodies of these animals?

12. What are some differences between plant and animal cells?

13. Are all micro-organisms harmful? Helpful?

14. What are structural adaptations that permitted animals to move from water to land?

15. What are the advantages of internal development over external development of the embryo?

16. What are some hazards of external development of embryos?

SUGGESTED DISCUSSION QUESTIONS (CONT'D)

17. Does the size of the animal have anything to do with his intelligence?

18. Which worms are helpful to man and which are harmful?

REPORTS

1. The way planarians regenerate.

2. Why infection from parasitic worms occurs predominately in certain areas.

3. The migrating birds.

4. The reasons for hibernation.

5. The LaBrea tar pits.

6. The evolution of the horse.

7. Dating biological fossils.

8. Flying reptiles and the earliest birds.

9. Effects that populations have on each other.

10. Methods of desalination.

11. How bees are raised commercially.

12. Anton Van Leeuwenhoek.

13. Description of a properly set up fresh water aquarium.

14. Description of a properly balanced salt water aquarium.

REPORTS (CONT'D)

15. The locomotion and economic importance of starfish.

16. The most common birds of Florida.

17. The poisonous snakes of Florida.

18. The behavior of the bottle-nosed porpoise.

19. The adaptations of animals which seem to indicate that they evolved from water to land.

20. The opossum -- an unusual pouched mammal.

21. The duck-billed platypus.

22. The helpful alligator in the Everglades.

23. Environmental conditions in Florida that might affect the preservation of some species of animals.

FIELD TRIPS

1. Crandon Park Zoo, Key Biscayne, 361-5421
   Contact: Superintendent's secretary

2. Everglades National Park, State Road 27, 10 miles southwest of Florida City (arrangements may be made by mail, P. O. Box 279, Homestead, Florida, 33030, or by telephone, 247-6211)

3. Miami Serpentarium, 12655 South Dixie Highway, 235-5722
   Contact: Tour director or secretary

4. Parrot Jungle, 11000 S. W. 57th Avenue, 661-3636
   Contact: Manager

FIELD TRIPS (CONT'D)

5. Seaquarium, Rickenbacker Causeway, 361-5703
   Contact: Receptionist

6. Museum of Science and Natural History, 3280 South Miami Avenue, 854-4242
   Contact: Office personnel

7. Tours related to animals, Dade County Parks, 50 S. W. 32nd Road, telephone 854-3530
   Contact: Naturalist

8. Monkey Jungle, 14805 S. W. 216 Street, 235-1611

SPEAKERS

Museum of Science, 3280 South Miami Avenue
Telephone, 854-4242

1. Insects - Identification of South Florida insects and methods of pinning and mounting specimens.
2. Reptiles and amphibians (mostly slides, some live and preserved specimens)
3. Microscopy. Study of microscopic plants and animals viewed through microscopes brought by lecturer.
4. Birds. Exploration into the anatomy of birds and the identification of most common South Florida birds -- mounted and live specimens.
5. Marine biology - South Florida's many species of plants and animals found in our tidal zones and shoreline.

FILMSTRIPS

Imperial Film Company, Inc.

The Vocabulary of Biology: Group 1
The Invertebrates:
1. Protozoans 646-1
2. Sponges and coelenterates 646-2
3. Flatworms and Echinoderms 646-3
4. Mollusks and Miscellaneous Groups 646-4
5. Arthropods (except insects) 646-5
6. Arthropods (insects) 646-6

The Vocabulary of Biology: Group II -
The Vertebrates
7. Tower Chordates 647-1
8. Fishes 647-2
9. Amphibians 647-3
10. Reptiles 647-4
11. Birds 647-5
12. Mammals 647-6

Eyegate House - six records and filmstrips
13. The Living Cell

Life Education Program, Box 834, Radio City Station, New York.
14. Coral Reef (World We Live In - Part 8)
15. Creatures of the Sea (World We Live In - Part 7)

Imperial Film Company, Inc.
16. The Everglades (Sound filmstrip)

Britannica, Great Names in Biology No. 8260
(Six filmstrips)

FILMS AVAILABLE THROUGH DADE COUNTY AUDIO-VISUAL CENTER

1. Mysteries of the Deep
   AV#1-31432, 28', C

2. Birds of a Florida Marsh
   AV#1-11196, 14'

3. Prowlers of the Everglades
   AV#1-30952, 26', C

4. Snakes of Florida
   AV#1-02877, 6', C

5. Introducing the Reptiles
   AV#1-11183, 17', BW

6. Alligator 16mm Color 14 ' (free from Central and Southern Florida Flood Control District, P. O. Box 1671, West Palm Beach, Fla. 33402)

7. Paramecium
   AV#1-02724, 10', BW

8. Amoeba, The
   AV#1-02717, 10', BW

9. Protozoa
   AV#1-02171, 11', BW

10. Bear Country
    AV#1-30699, 31', C

11. Seal Island
    AV#1-30689, 27', C

12. Coral Wonderland
    AV#1-30697, 30', C

13. Gulf of Mexico Invertebrates
    AV#1-02704, 15' C Silent

14. Insect Collecting
    AV#1-11155, 14', C

FILMS (CONT'D)

15. The Invertebrates
AV#1-11145, 14', BW

16. Marine Animals of the Open Coast
AV#1-11075, 22', C

17. The Mollusks
AV#1-11149, 14', BW

18. Praying Mantis
AV#1-02781, 9', C

19. Realm of the Honey Bee
AV#1-40037, 60', BW (Silent)

20. Secrets of the Underwater World
AV#1-11144, 16', C

21. Sea Turtles of Florida
AV#1-11191, 14', C

22. Water Birds
AV#1-30705, 32', C

23. Royal Birds of Florida
AV#1-02978, 10', C

24. Snakes of Florida
AV#1-02877, 6', C

FILM LOOPS (Not available from audio-visual services. Consult your own school librarian)

1. Paramecium
2. Rotifer
3. Amoeba
4. Characteristics of Living Things
5. Comparative Sizes of Microscopic Animals
6. Duck billed Platypus
7. Wonders of the Coral Jungle

REFERENCES

1. Brandwein, Paul F. and others. Life Its Forms and Changes. New York: Harcourt, Brace and World, Inc., 1968.
2. Carr, Archie. The Reptiles. Life Nature Library. New York: Time-Life Books, 1963.
3. Carrington, Richard. The Mammals. New York: Time Inc., 1963.
4. Farb, Peter. The Insects. Life Nature Library. New York: Time Inc., 1962.
5. Frazier, Ralph and Smith, Herbert A. The Biological Sciences. River Forrest, Illinois: Laidlaw Brothers, 1969.
6. Laboratory Activities for Science Students Junior High Level, Experimental Edition, Dade County Board of Public Instruction, 1968.
7. Mason, John M. and Peters, Ruth. Life Science A Modern Course. Princeton, New Jersey:

REFERENCES (CONT'D)

Van Nostrand Company, Inc., 1965.

8. Maxwell, Lewis S. Florida Insects. Tampa, Florida: Lewis S. Maxwell, 1965.

9. Maxwell, Lewis S. Florida Poisonous Plants, Snakes. Tampa, Florida: Lewis S. Maxwell, 1963.

10. National Audubon Society, Audubon Nature Encyclopedia. 12 volumes. Curtis Publishing Company, 1965.

11. National Geographic Society. Wild Animals of North America. Washington, D.C.: National Geographic, 1960.

12. National Geographic Society. Wondrous World of Fishes. Washington D.C.: National Geographic, 1965.

13. Ommanney, F. D. The Fishes. Life Nature Library. New York: Time Life Books, 1963.

14. Oxenhorn, Joseph M. and Idelson, Michael N. Pathways in Science, Biology - The Materials for Life. New York: Globe Book Company, 1968.

15. Peterson, Roger Tory. The Birds. Life Nature Library. New York: Time Inc., 1963.

16. Pfeiffer, John. The Cell. Life Science Library. New York: Time-Life Books, 1964.

17. Science Lab 7 and 8, Laboratory Activities ITV Teacher's Guide, Dade County Board of Public Instruction.

18. The Readers' Digest Association. Marvels and Mysteries of Our Animal World. Pleasantville, New York: Readers' Digest, 1964.

REFERENCES (CONT.D)

19. Thurber, Walter and Kilburn, Robert. Exploring Life Science. Boston: Allyn and Bacon, Inc., 1966.

MASTER SHEET - THE WORLD OF ANIMALS

Objectives	Film Strips	Field Trips	Demonstrations	Projects	Reports	Speakers	Laboratory Experiments	Student Text	Supplementary References	Films	Film Loops	Discussion Questions
1							1, 15.	3 pp.81-86 4 p.465 1 pp.525-530				
2		6	5	2,15, 17		3	3 4,13, 14	2 pp.22-32 1 pp.76-82 3 pp.90-91	3 pp.15, 18,14	7,8,9	1,2,3, 5	7, 13
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4			4, 10	14,16	1	1	19,20, 28	2 pp.40-51 1 pp.70-74 3 pp.41-43	3 p.14		4	3, 5, 6
5	2,3,4, 5,6,14	2, 6		1,3,4, 6,9,13	2,7,11, 15		17,5,6, 7,8,9, 17,24, 26,29, 30,31	2 pp.203-245 1 pp.372-373 3 pp.22-26	1 pp.108-110 3 pp.40-45 10	12,13, 14,15, 17,18, 19	7	8, 9, 10 16, 18
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8	16	1,2,3, 4,5,6, 7		1,8,9, 13,24	16,17, 18		1	2 p. 26	18 3 p. 15 19 20	23,4, 6,24		
9	16	1,2,4, 6,7		19,21, 20	9,23, 22	1,4, 5			3 pp.40; 140	2,6, 23		
10		2, 6		22,23	18,20, 21			2 p.26	17,19,20			
11	17				12			3 pp.87-88 88 3 pp.15-17				

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AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

DADE COUNTY PUBLIC SCHOOLS

ANIMAL LIFE

5311.16
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SCIENCE

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DIVISION OF INSTRUCTION • 1971

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ANIMAL LIFE

5311.16

5312.16

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SCIENCE

(Experimental)

Written by Bettie Lou McCollum

for the

DIVISION OF INSTRUCTION
Dade County Public Schools
Miami, Florida
1971

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Miami, Florida 33135

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TABLE OF CONTENTS

ANIMAL LIFE

COURSE DESCRIPTION

Animal Life is an activity-oriented course designed to acquaint the student with the importance of animals in every aspect of his life. Topics include recognition and characteristics of harmful and beneficial animals, natural communities, energy relationships, animals that are characteristic of Florida and animals that are of economic importance to Florida.

ENROLLMENT GUIDELINES

None.

STATE ADOPTED TEXTS

1. Brandwein, Burnett, and Stollberg, Life: Its Forms and Changes. New York: Harcourt, Brace and World, 1968.

2. Frazier and Smith. The Biblogical Sciences. River Forest, Illinois: Laidlaw, 1969.

3. Oxenhorn and Idelson, Pathways in Science, Biology I, II, III. New York: Globe Book Co., 1970.

4. Thurber and Kilburn. Exploring Life Science. Boston: Allyn and Bacon, 1966.

PERFORMANCE OBJECTIVES

The student will:

1. Given a diagram of a food chain, describe how living things obtain energy for themselves and provide energy for other living things.

2. Given an example of the population of a community, cite evidence to support the fact that populations are affected by two kinds of factors: species factors and environmental factors.

3. Given a list of animals, identify the ways in which each is helpful to man.

4. Given a list of animals, identify ways in which each is harmful to man.

5. Given a list of animals in a community, match each with the appropriate term: predator, parasite, and scavenger.

6. Given a diagram of the carbon cycle, explain why the carbon supply stays about the same from year to year.

7. Given a diagram of the nitrogen cycle (without arrows showing relationships), insert arrows tracing the cycle beginning with green plants.

8. Given examples of natural communities, suggest how weather conditions, fire, activities of man and other animals can bring about serious changes in a community.

9. Explore various methods for grouping animals as a means of organizing knowledge.

10. Given pictures of various animals, recognize those that are characteristic of Florida.

PERFORMANCE OBJECTIVES (CONT'D)

11. Given examples of animals that are in danger of becoming extinct in Florida, propose ways to prevent this from happening.

12. Identify animals that are important to Florida's economy.

COURSE OUTLINE

I. General Energy Relationships

A. Patterns in acquiring energy
   1. Primary producers - green plants
   2. Consumers
      a. Herbivores
      b. Garnivores
   3. Decomposers

B. Carbon cycle

C. Nitrogen cycle

II. Factors Affecting Animal Populations Within a Community

A. Species factors
   1. Number of offspring
   2. Care of young
   3. Age of maturation
   4. Length of life

B. Environmental factors
   1. Predators
   2. Disease
   3. Availability of food and water
   4. Weather
   5. Natural disasters
   6. Man's activities

COURSE OUTLINE (CONT'D.)

III. How Animals are Helpful to Man

A. Food

B. Animal products

C. Transportation

D. Scavengers

E. Scientific research

F. Tillers of the soil (Earthworm)

G. Animals in fossil fuel (oil)

IV. How Animals are Harmful to Man

A. Insects
1. Locusts
2. Mosquitos
3. Fruit flies
4. House flies
5. Termites
6. Ticks

B. Disease carrying mannals
1. Rats
2. Dogs
3. Cattle

C. Protozoan diseases
1. Sleeping sickness
2. Malaria
3. Amoebic dysentery

D. Worms
1. Hookworm
2. Tapeworm

V. Classification of Animals

A. Classifying is arbitrary

COURSE OUTLINE (CONT'D.)

B. Number and type of similarities
   1. Skeletons
   2. Body shape
   3. Embryos
   4. Method of moving about
   5. Number of cells
   6. Photosynthetic pigment
   7. Land and water adaptations

C. Catalogue of animals is useful to man

VI. Characteristic Animals of Florida

A. Wildlife

B. Freshwater fishes

C. Commercial fishing

D. Domestic animals

VII. Animal Conservation in Florida

A. Wildlife needs suitable environment

B. Problems
   1. Special interest groups
      a. Lumbermen
      b. Oilmen
      c. Housing developers
      d. Airports
      e. Power companies
   2. Population changes

LABORATORY INVESTIGATIONS

Science Lab 7 and 8 Laboratory Activities, ITV Teacher's Guide, Dade County Board of Public Instruction. 1966 (These activities are in the 1967 edition of Science Lab: 7 & 8 but the page numbers are different.)

1. Microcosm (pp. 44-45)
2. Bacteria: Environmental Factor in an Animal Community (pp. 57-59)
3. How can we culture and study some living protozoans? (pp. 88-89)
4. How can we become familiar with some of the structures of two representative metazoans? (pp. 90-94)
5. How can we study insects in their natural habitat? (pp. 101-102)
6. Worms: flat, round, segmented (pp. 95-96)
7. What methods of classification are used in grouping living organisms? (pp. 34-35; Use key pp. 83-87)
8. How can we collect and identify insects? (pp. 106-107; Use key pp. 83-87)
9. How can we collect and identify insects or other small invertebrate animals? (pp. 103-105; Use key pp. 108-110)
10. What organs and structures of the fish can you identify as being similar to those found in the human body? (pp. 111-114)
11. Do living things produce carbon dioxide? (pp. 131-132)

Thurber and Kilburn. Exploring Life Science, Boston: Allyn and Bacon, Inc., 1966.

12. Structure of a typical insect: grasshopper pp. 60-63)
13. Comparing different insects (p. 67)
14. Production of carbon dioxide (p. 212)
15. The use of carbon dioxide by plants (p. 25)
16. Variety in protozoans (p. 311)
17. The clam (p. 350)
18. Structure of daphnia (p. 366)
19. Structure of a bony fish (pp. 379-384)
20. Anatomy of a chicken (pp. 406-408)

LABORATORY INVESTIGATIONS (CONT'D.)

21. Development of chick embryos (pp. 454-456)
22. Effects of salt water on fresh water life (p. 25)

DEMONSTRATIONS

Science Lab 7 and 8 Laboratory Activities, ITV Teacher's Guide, Dade County Board of Public Instruction.

1. Does Food Contain Energy? If So, How Can We Prove It? (pp. 141-143)
2. How Can We Demonstrate the Production of Energy By a Living Thing? (pp. 144-145)
3. How Can We Demonstrate the Internal and External Structures of a Vertebrate animal - the Frog? (pp. 152-161)
4. Does a Green Plant Produce Oxygen When Carrying on Photosynthesis? (pp. 66-67)

Thurber and Kilburn, Exploring Life Science. Boston: Allyn and Bacon, Inc., 1966.

5. Development of Fruit Flies (p. 69)
6. Respiration of Small Aquatic Animals (p. 236)
7. Effect of Temperature on Respiration of Small Aquatic Animals (p. 236)

Frazier and Smith. The Biological Sciences. River Forrest, Illinois: Laidlaw Brothers, 1969.

8. Observation of Development of Tadpoles (p. 253)
9. Examination of a Leguminous Plant (p. 105)

Brandwein and others. Life Its Forms and Changes. Atlanta: Harcourt, Brace and World, Inc., 1968.

10. Observation of Circulation of Blood in a Capillary - Goldfish (p. 119)

11. Decay Bacteria Part of the Food Chain (p. 243)

SPEAKERS

Crandon Park Zoo, Key Biscayne, 361-5421
Contact: Superintendent's secretary

1. Speakers on zoo animals

Seaquarium, Rickenbacker Causeway, 361-5703
Contact: Receptionist

2. Lecturer on marine life

Museum of Science and Natural History, 3280 South Miami Avenue, 854-4242
Contact: Office personnel

3. Speaker on animals (live animals brought into the classroom to familiarize the student with different groups of animals)
4. Reptiles and amphibians (slides and some live and preserved specimens)
5. Birds (anatomy of birds and the identification of the most common South Florida birds)
6. Marine Biology (South Florida plants and animals found in our tidal zones and shoreline)
7. Insects (identification of South Florida insects and the methods of proper pinning and mounting of specimens. Insect anatomy and the beneficial and harmful aspects of selected specimens will be discussed.)

Humane Society of Greater Miami, 2101 N. W. 95th Street, 696-0800
Contact: Executive Director

8. Care and treatment of animals

Zoological Society of Florida
3280 South Miami Avenue, 374-8451
Contact: President

9. All types of animals

PROJECTS

1. Draw diagrams of food chains found in the ocean, forests and fresh water ponds.

2. Make a chart showing examples of herbivores and carnivores.

3. Draw a diagram of the carbon cycle.

4. Watch the behavior of birds in a flock. Report on the way they take off and land, and how they behave during flight (Ref. 29, p. 103)

5. Draw a diagram of the nitrogen cycle.

6. Draw (or collect) pictures of birds that change in appearance when they molt.

7. Set up a properly balanced fresh water aquarium (Ref. 19)

8. Set up a properly balanced salt water aquarium. (Ref. 19)

9. Breeding of tropical fish.

10. Draw a diagram showing the life cycle of the fluke.

11. Make a poster identifying common Florida insects.

12. Make a poster identifying some common birds of Florida.

13. Make a collection of preserved insect specimens (Ref. 26, p. 46)

14. Interview an exterminator from a local pest control company. Report to class on methods of control of insects in South Florida. (Ref. 26, p. 46)

15. Identify on a map of Florida where different varieties of fish may be found.

PROJECTS (CONT'D.)

16. Take photographs of different insect homes.

17. Devise your own system of classification of animals.

18. Prepare a miniature museum exhibit of a natural community. (Ref. 29, p. 471)

19. Draw a diagram showing the life cycle of a mosquito.

20. Draw a diagram showing the life cycle of a butterfly.

21. Make a study of adaptations in birds. (Ref. 2, p. 409)

22. Make a poster identifying the wildlife of Florida.

23. Make a poster identifying those animals that are of economic importance to Florida.

24. Make a conservation poster that will illustrate animals of Florida that are in danger of becoming extinct.

25. Make a chart identifying animals, their communities, and how they are helpful to man.

26. Construct a miniature museum identifying predators, scavengers and parasites.

REPORTS

1. Organisms within a community affect each other in many ways. (Discuss competition and commensalism,(Ref. 29, pp. 18-22)

2. Parasites: external and internal (Ref. 29, pp. 21-22)

3. Explain the relationship between termites and certain microscopic organisms that live in the intestines of the termite. (Ref. 29, p. 23)

4. Write a report on micro-organisms that help cows digest the cellulose in grass and hay. (Ref. 29, p. 143)

5. Write a report on the importance of micro-organisms in the soil. (Ref. 29, p. 142)

6. Write a report on seasonal migration of birds. (Ref. 29, pp. 102-103)

7. Write a report on the hibernation of certain animals. (Ref. 29, p. 105)

8. Tell how the following species factors affect animal populations within a community: number of offspring, care of young, age of maturation and length of life.

9. Select a community and tell how the following environmental factors affect it: predators, disease, availability of water and food, weather, natural disasters, and activities of man.

10. The salmon's journey to death.

11. Report on rabies.

12. Report on tetanus.

13. The helpful honeybee

14. Citrus industry fights the fruit fly.

REPORTS (CONT'D.)

15. Typhoid fever.

16. The hookworm waits for a bare foot.

17. Disease carrying mammals (rats, dogs, cattle)

18. Protozoan diseases (sleeping sickness, malaria, amoebic dysentery)

19. Parasitic flatworms (flukes and tapeworms)

20. Give a class report on the location of different varieties of fish in Florida.

21. The necessity for hunters and fisherman to obey conservation laws.

22. The economic importance of fish in Florida.

23. How community action can control germ diseases.

24. Unusual pets you have had, such as hamsters, iguanas, snakes.

25. Report on the origin and the development of coral islands in the South Florida area.

26. Wildlife of Florida.

27. Livestock industry in Florida. (Ref. 27)

28. Poisonous snakes of Florida.

29. South Florida poisonous insects.

30. Important insect pests, (Ref. 1, p. 23).

31. Homes of insects (Ref. 9, pp. 28-29)

32. The societies of ants (Ref. 9, pp. 171-181)

33. The common housefly (Ref. 9, pp. 28-29)

REPORTS CONT'D.

34. "The Miraculous Shelled Egg" (Ref. 4, pp. 124-125)

35. "Family Life Among the Mammals" (Ref. 6, Ch. 7)

36. Mammals of the sea (Ref. 7, Ch. 8)

37. America's only pouched mammal - opossum (Ref. 18, Ch. 22)

38. The helpful alligator in the Everglades.

39. How can special interest groups affect the wildlife in the Everglades?

40. Water pollution affects all animals.

41. How change in water temperature affects marine life.

42. Adaptations have made it possible for animals to move from water to land.

43. Survival of the fittest.

FIELD TRIPS

1. Crandon Park Zoo, Key Biscayne, 361-5421
   Contact: Superintendent's secretary

2. Everglades National Park, State Road 27, 10 miles southwest of Florida City. (Arrangements made by mail, P. O. Box 279, Homestead, Florida, 33030, or by telephone, 247-6211)

3. Miami Serpentarium, 12655 South Dixie Highway, 235-5722 - Contact: Tour director or secretary

4. Parrot Jungle, 11000 S. W. 57 Avenue, 661-3636
   Contact: Manager

5. Seaquarium, Rickenbacker Causeway, 361-5703
   Contact: Receptionist

6. Museum of Science and Natural History, 3280 South Miami Avenue, 854-4242

7. Nature Trails, Dade County Parks, 50 S. W. 32nd Road, telephone 854-3530 - Contact: Naturalist

8. Humane Society of Greater Miami, 2101 N. W. 95th Street, 696-0800.
   Contact: Executive Director

DADE COUNTY 16mm FILMS

1. Water Birds
   AV#1-30705, 32', C

2. Introducing the Reptiles
   AV#1-11183, 17', BW

3. Life In the Ocean
   AV#1-11043, 18', C

4. Life In the Woodlot
   AV#1-11062, 17', C

5. Mollusks, The
   AV#1-11149, 14', BW

6. Secrets of the Ant and Insect World
   AV#1-11157

7. Mysteries of the Deep
   AV#1-31432, 28', C

8. Sea, The
   AV#1-31481, 27', C

9. Animal Predators and Balance of Nature
   AV#1-05650, 11', C

10. Birds of a Florida Marsh
    AV#1-11196, 14', C

11. Birds and Their Characteristics
    AV#1-02892, 11', C

12. Birth of a Florida Key
    AV#1-12252, 18', C

13. Prowlers of the Everglades
    AV#1-30952, 26', C

14. Sea Turtles of Florida
    AV#1-11191, 14', C

15. Snakes
    AV#1-02868, 11', C

FILMS (CONT'D)

16. Snakes of Florida
AV#1-02877, 6', C

17. Balance in Nature
AV#1-11141, 17', C

18. Changing Forest
AV#1-11496, 19', C

19. Coral Wonderland
AV#1-30697, 30', C

20. Earthworms
AV#1-02734, 10', C

21. Honeybee, The
AV#1-11174, 14', C

22. Housefly, The
AV#1-11168, 17', BW

23. Insect Collecting
AV#1-11155, 14', C

24. Marine Animals of the Open Coast (A Story of Adaptations) AV#1-11075, 22', C

25. Natural Enemies of Insect Pests
AV#1-30703, 27', C

26. Termites
AV#1-11165

27. Bear Country
AV#1-30699, 31', C

28. Seal Island
AV#1-30689, 27', C

29. Beaver Valley
AV#1-30394, 32', C

FILMS (CONT'D.)

Films below may be obtained free from Central and Southern Florida Flood Control District, P. O. Box 1671, West Palm Beach, Florida 33402.

30. Alligator
14', C

31. Flight Into Oblivion
14', C

32. Marisa and the Mermaid
14', C

33. Million Acre Playground

FILMSTRIPS

McGraw Hill

Interdependence of Living Things 405590 (6 filmstrips)

1. "Introduction to Ecology"
2. "Web of Life"
3. "Animal and Plant Communities: Forest"
4. "Animal and Plant Communities: Field"
5. "Animal and Plant Communities: Pond"
6. "Animal and Plant Communities: City"

Britannica

Animals Without Backbones 10750 (5 filmstrips)

7. "One-celled Animals"
8. "Different Kinds of Worms"
9. "The Snail and Its Relatives"
10. "The Sea Star and Related Spiny-Skinned Animals"
11. "Lobster and Its Relatives"

Animals With Backbones 10780 (7 filmstrips)

12. "What is a Vertebrate"
13. "Discovering Fishes"
14. "Discovering Amphibians"

FILMSTRIPS (CONT'D.)

15. "Discovering Birds"
16. "Observing Birds in Nature"
17. "Discovering Mammals"
18. "Discovering Reptiles"

Animals Without Backbones 9210 (One of four)

19. "The Insects" Harmful and Useful"

Maintaining Biological Specimens 11590 (Only four of set)

20. "How to Make an Aquarium"
21. "How to Make a Terrarium"
22. "Caring for Warm Blooded Animals"
23. "How to Raise Insects"

Imperial Film Company

Ecological Systems, Group I 434-C (Four filmstrips and cassettes)

24. "Ecology of a Seashore"
25. "Ecology of a Forest"
26. "Ecology of a Pond"
27. "Ecology of a Desert"

SUGGESTED DISCUSSION QUESTIONS

1. Do all food chains begin with green plants?

2. What are some organisms that make up several different food chains?

3. What are some internal parasites?

4. What are some external parasites?

5. Why are green plants called the primary producers in a food chain?

6. Populations within a community are affected by species factors and environmental factors. Name some species factors. Name some environmental factors.

7. What are some changes that take place in the bodies of animals as they begin to hibernate?

8. Does the length of day and night affect the color of the coat of an animal and the time at which it changes?

9. What are predators? Give several examples.

10. What are scavengers? Give several examples.

11. Is there any "best" system for classifying animals?

12. What is the major difference between an amphibian and a reptile?

13. What are two characteristics of mammals?

14. What are the adaptations that are necessary for animals to survive on land?

15. Although marine worms produce many offspring, the population remains about the same. Can you explain this?

16. Mammals produce relatively few offspring. What

SUGGESTED DISCUSSION QUESTIONS (CONT'D.)

is the reason for their high survival rate?

17. Do you think that simple organisms such as paramecium and hydra "think" before they respond to stimuli?

18. Describe the care, or lack of care, given to offspring by their parent or parents. How does this affect the population of the species?

19. Do any of the external features of the frog indicate the environment that he lives in?

20. The female frog deposits hundreds of eggs in the water for fertilization, yet the population of frogs does not change drastically through the years.

21. What is a natural community?

22. Why are predators and scavengers important in a natural community?

23. Why are saprophytes of great importance to a community?

24. What animals are important to the economy of Florida? (livestock, wildlife, commercial and game fishing)

25. What are some reasons for animals becoming extinct? How can we prevent this from happening in Florida?

26. Is there any "best" method for grouping animals?

27. Discuss the important role green plants have in the nitrogen cycle.

28. What is responsible for the carbon supply staying about the same?

29. There are probably more helpful animals than harmful. Identify some of these and tell how they are helpful.

REFERENCES

1. Baranowski, Richard. Insects. Golden Bookshelf of Natural History. New York: Golden Press, 1964.

2. Brandwein, Paul F. and others. Life Its Forms and Changes. New York: Harcourt, Brace and World, Inc., 1968.

3. Brandwein, Paul F. and others. The World of Living Things. New York: Harcourt, Brace and World, Inc., 1964.

4. Carr, Archie. The Reptiles. Life Nature Library. New York: Time-Life Books, 1963.

5. Carrington, Richard. The Mammals. New York: Time, Inc., 1963.

6. Carrington, Richard. The Mammals. Young Readers Edition. New York: Time-Life Books, 1967.

7. Engle, Leonard, The Sea. Life Nature Library, New York: Time-Life, 1961.

8. Farb, Peter, The Forest. Life Nature Library, New York: Time, Inc., 1961.

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10. Ford, Charles A. ed. Compton's Dictionary of the Natural Sciences. 2 volumes. Chicago: Compton, 1966.

11. Frazier, Ralph and Smith, Herbert A. The Biological Sciences. River Forrest, Illinois: Laidlaw Brothers, 1969.

12. Laboratory Activities for Science Students Junior High Level. Bulletin 8G. Experimental Edition, Dade County Board of Public Instruction, 1968.

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13. Mason, John M. and Peters, Ruth. Life Science A Modern Course. Princeton: D. Van Nostrand Co., Inc., 1965.

14. Maxwell, Lewis S. Florida Insects. Tampa, Florida: Lewis S. Maxwell, 1965.

15. Maxwell, Lewis S. Florida's Poisonous Plants, Snakes, Insects, Tampa, Florida: Lewis S. Maxwell, 1963.

16. Milne, Lorus and Margery. The Nature of Animals Philadelphia: J. B. Lippincott Co., 1969.

17. National Audubon Society, Audubon Nature Encyclopedia. 12 volumes. Philadelphia:

18. National Geographic Society, Wild Animals of North America , Washington, D.C.: 1960.

19. National Geographic Society, Wondrous World of Fishes. Washington, D.C.: National Geographic Publishing Co., 1965.

20. Ommanney, F. D., The Fishes. Life Nature Library New York: Time-Life Books, 1963.

21. Oxenhorn, Joseph M. and Idelson, Michael N. Pathways in Science, Biology I. New York: Globe Book Company, 1970.

22. Oxenhorn, Joseph M. and Idelson, Michael N. Pathways in Science, Biology II. New York: Globe Book Company, 1969.

23. Oxenhorn, Joseph M. and Idelson, Michael N. Pathways in Science, Biology III. New York: Globe Book Company, 1970.

24. Peterson, Roger Tory. The Birds. Life Nature Library. New York: Time Inc., 1962.

REFERENCES (CONT'D.)

25. Science Lab 7 and 8, Laboratory Activities, ITV Teacher's Guide, Dade County Board of Public Instruction.

26. Science 7 and 8 ITV Teacher's Guide. Dade County Board of Public Instruction.

27. The Florida Handbook, Tallahassee, Florida: The Peninsular Publishing Company, 1967-68.

28. The Reader's Digest Association. Marvels and Mysteries of Our Animal World, Pleasantville, New York: Readers Digest, 1964.

29. Thurber, Walter and Kilburn, Robert. Exploring Life Science. Atlanta: Allyn and Bacon, Inc., 1966.

MASTER SHEET - ANIMAL LIFE

Objectives	Experiments	Student Text	Supplementary Reference	Films	Film Strips	Reports	Demonstrations	Speakers	Field Trips	Projects	Discussion Questions
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AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

FOUR LEGGED AND OTHERWISE

5314.02

SCIENCE
(Experimental)

DADE COUNTY PUBLIC SCHOOLS
DIVISION OF INSTRUCTION • 1971

FOUR LEGGED AND OTHERWISE

5314.02

SCIENCE

(Experimental)

Written by David Z. Kleinman and Clayton Hendrix

for the

DIVISION OF INSTRUCTION
Dade County Public Schools
Miami, Florida
1971

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Copies of this publication may be obtained through

Textbook Services
2210 S. W. Third Street
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Price: $.75

TABLE OF CONTENTS

FOUR LEGGED AND OTHERWISE

COURSE DESCRIPTION

An elementary course in general zoology with emphasis on the economic value of the Fauna of South Florida. Ecological relationships and the effects of pollution will also be covered. Some time will be devoted to unusual animals found in Florida.

ENROLLMENT GUIDELINES

This course is for the terminal science student.

STATE ADOPTED TEXTS

1. Biological Science Curriculum Study. Biological Science: An Inquiry Into Life. (Yellow Version) 2d ed. New York: Harcourt, Brace and World, 1968.

2. Biological Science Curriculum Study. Biological Science: Molecules to Man, 2d ed. (Blue Version) Boston: Houghton Mifflin, 1968.

3. Biological Science Curriculum Study. High School Biology: BSCS, 2d ed. (Green Version) Chicago: Rand McNally, 1968.

4. Biological Science Curriculum Study. Patterns and Processes. New York: Holt, Rinehart, Winston Co., 1966.

5. Brandwein, et al., Life Its Forms and Changes. New York: Harcourt, Brace and World, 1968.

6. Brandwein, et al. The Earth: It's Living Things New York: Harcourt, Brace, Jovanovich, 1970.

STATE ADOPTED TEXTS (CONT'D)

7. Oxenhorn, Pathways in Science: Biology 3. New York: Globe Book Co., Inc., 1970.

8. Smallwood and Green, Biology. Morristown, New Jersey: Silver Burdett, 1971.

9. Wong and Dolmatz, Ideas and Investigations in Science: Biology. New Jersey: Prentice-Hall, Inc., 1971.

PERFORMANCE OBJECTIVES

1. Given an assortment of specimens (preserved, live, models, or visuals of same) the student will identify a representative sample of each major phylum.

2. Differentiate between a vertebrate and an invertebrate.

3. Show evidence for the interdependence of plants and animals in terms of habitat.

4. Distinguish between two or more common South Florida beneficial vertebrates and their harmful relatives.

5. Distinguish between a given number of harmful common South Florida invertebrates and their beneficial relatives.

6. Devise an experiment which will demonstrate one of the following types of pollution in the South Florida environment:
   a. phosphate
   b. mercury
   c. DDT
   d. lead

PERFORMANCE OBJECTIVES (CONT.D)

7. Given a number of major zoological group representatives, the student will arrange them in their proper position on the food chain.

8. Given a number of specimens, the student will give their economic value to humans.

COURSE OUTLINE

I. Mammals of Florida

A. Land mammals
   1. Wild
   2. Domestic

B. Water mammals

C. Marsh and Everglades mammals

D. Endangered mammals
   1. Pollution
   2. Human encroachment

II. Birds of Florida

A. Land birds

B. Water birds
   1. Fresh water
   2. Salt water

C. Marsh and Everglades birds
   1. Effects of the Flood Control District on birds
   2. Effect of draining of swamp on birds
   3. Effect of pesticide use on bird habitats

COURSE OUTLINE (CONT.D)

D. Endangered species
   1. Cause of danger
   2. Ways to prevent extinction

III. Other Florida Vertebrates

A. Reptiles
   1. Habitat
   2. Endangered species
   3. Economic value

B. Amphibians
   1. Habitat
   2. Effects of water pollution
   3. Effects of pesticides
   4. Effects of swamp drainage

C. Fish
   1. Fresh water
      a. Edible and non-edible
      b. Effects of drought in everglades
      c. Eutrophication
   2. Salt water
      a. Sport and commercial
      b. Mercury contamination

IV. Florida Invertebrates

A. Shellfish (crustaceans)
   1. Edible
   2. Effects of mercury
   3. Polluted estuaries
   4. Spawning grounds of shrimp

B. Insects
   1. Helpful
   2. Harmful
   3. Resistant species
   4. Special adaptations

C. Mollusks
   1. Edible

2. Destructive mollusks and their control
3. Habitat and bulkhead lines

D. One-celled organisms
1. Helpful
2. Disease producers
3. Polluters and destroyers
4. Water supply contaminators

V. Sponges

A. A marine community

B. Tarpon Springs, Florida

VI. Coelenterates

A. Decorative coral

B. Dangerous Coelenterates

VII. Echinoderms

VIII. Oddballs of the Animal World

A. Walking catfish

B. Manatee

C. Flamingo

D. Hermit crab

E. Parrot fish

F. Egret

G. Pelican

H. Octopus

I. African Snail (giant)

EXPERIMENTS

Biological Science Curriculum Study. Laboratory Guide, Biological Science: An Inquiry Into Life, Yellow Version. New York: Harcourt, Brace & World, 1968.

1. Structure and Function in Paramecium (Ex 18-2, p. 128)
2. Locomotion in Paramecium, (Ex 18-3, p. 130)
3. Reproduction in Paramecium (Ex. 18-6, p. 130)
4. Parasitic and Free Living Ways of Life (Ex 20-1 p. 161)
5. Form and Function of the Frog (Ex 20-3 p. 169)

Otto, Towle, Crider. Biology Investigations New York: Holt, Rinehart & Winston Inc., 1965.

6. Porifera -- The Sponges (Ex 27-1, p. 237)
7. The Coelenterates (Ex 27-2, p. 239)
8. Platyhelminthes -- The Flatworms (Ex 28-1, p.243)
9. Nematoda -- The Roundworms (Ex 28-2, p. 249)
10. Mollusca -- The Softbodies Animals (Ex 29-1, p. 257)
11. The Earthworms -- A Representative Annelid (Ex 28-3, p. 251)
12. The Crustaceans (Ex 30-1, p. 261)
13. The Grasshopper (Ex. 31-1, p. 267)
14. Study of a Bony Fish (Ex 3401, p.269)
15. Effect of Temperature on Goldfish Respiration Rate (Ex 34-3, p. 275)
16. Dissection of the Fish (Ex 34-2, p. 273)
17. External Structure of the Frog (Ex 35-1, p. 281)
18. Dissection of the Frog (Ex. 35-2, p. 281)
19. Dissection of the Fetal Pig (Ex 28-1, p. 289)
20. Nutritional Relationships (Ex 49-1, p. 333)

Green, Peterson, et al. Laboratory Guide for Biology. Morristown, New Jersey: Silver Burdett, 1969.

21. The Earthworm Part 1 (Ex D -1, p. 135)
22. The Earthworm Part 2 (Ex D - 2, p. 137)
23. The Behavior of Isopods (Ex 28.2, p. 125)
24. Sexual Reversal in Guppies (Ex. 20.1, p. 101)
25. Food Webs (Ex. 29.1, p. 129)

EXPERIMENTS (CONT.D)

Green and Bobrowsky, Laboratory Investigations in Biology. Morristown, New Jersey: Silver Burdett, 1971.

26. The Earthworm (Ex 23, p. 91)
27. The Grasshopper (Ex 24, p. 97)
28. The Age of a Fish (Ex 56, p. 245)
29. Clam Dissection (Ex. D-3, p. 140)
30. The Frog (Ex 25, p. 103)

Biological Science Curriculum Study. High School Biology. BSCS Green Version. 2d. ed. Chicago: Rand McNally Inc., 1968.

31. Behavior of an Invertebrate Animal (Sow bug) (Ex 15-2, p. 554)

Bulletin 8F. Supplementary Activities for Biology (Tentative) Dade County Public Schools, Miami, Florida, 1969.

32. Goldfish Observation (p. 1)
33. Telling Time by Measuring the Speed of Ants (p. 14)
34. Cricket Thermometers (p. 16)
35. Plants, animals or protists? (p. 18)
36. Grouping plants and animals (p. 20)
37. The Animal Kingdom (p. 22)
38. To Eat or Not to Eat (p. 41)
39. The World of Insects (p. 42)
40. Spider Web and Spider Web Collection (p. 44)
41. Invertebrates (p. 45)
42. Worm Haven (p. 49)

DEMONSTRATIONS

1. Set up two tanks of fish. Spray the top of the water of one tank with an insecticide. Observe the results. BE SURE TO REMOVE THE FISH BEFORE THEY DIE.

2. Put several mice in a dry fish tank. Put a cover over the tank but leave openings for air. Put in a pocket sized transistor radio, turned to WQAM or WINZ or a similar station, with the volume turned up. Observe the behavior for a few days. If a control is desired set up a similar tank without the radio.

3. Set up a five or ten gallon fish tank with 40 to 50 guppies or gold fish or similar fish. Observe the r esults.
This can be done with 25 or 30 white mice in a five or ten gallon fish tank. In both cases be sure to put in enough food and water for the total number of animals.

PROJECTS

Bulletin 8F. Supplementary Activities for Biology. (Tentative) Dade County Public Schools, Miami, Florida, 1969.

1. Learning to Dissect (p. 177)

2. Grasshopper (p. 179)

3. Knights of the Sea (p. 183)

4. Dissection of Fish (p. 185)

5. Crossword Puzzles
   a. Crayfish (p. 214)
   b. Earthworm (p. 218)
   c. Fish (p. 220)
   d. Grasshopper (p. 222)
   e. Protozoans (p. 224)

REPORTS

1. Have students give reports on endangered mammals and birds and have them suggest ways to prevent total extinction.

2. Build a bird feeding station on school grounds to:
   1. Identify South Florida birds
   2. Photograph birds which frequent the station.
   3. Report results in a scientific manner.

3. The medicinal value of snake venom.

4. Field trip safety.

5. Have students report on animals and use supplementary visuals.

6. Compare the structure of the heart or similar structure (breathing apparatus, brain, limbs) of several of the animals which were studied in the course.

7. The economic value of one or more animals studied in the course. This can be modified to show examples of mammal orders or bird orders.

FIELD TRIPS

1. Everglades National Park
   State Road 27
   Homestead, Florida
   Phone: 247-6211

2. Crandon Park Zoo
   Crandon Park
   Key Biscayne, Florida

3. Bear Cut Conducted Tour Available, contact:
   Metropolitan Dade County
   Parks and Recreation Department
   50 Southwest 32nd Road, Miami

4. A Field Trip to Study Insects:
   Agricultural Research and Education
   Center of the University of Florida's
   Institute of Food and Agricultural Science
   formerly,
   Subtropical Experiment Station
   University of Florida
   18905 Southwest 208 Street
   Homestead, Florida

SPEAKERS

1. Tropical Audubon Society -- Mrs. Flora O'Brien,
   4440 W. Flagler Street

2. Everglades National Park -- 247-6211.

3. Game and Fresh Water Fish Commission -- Mr. Jim
   Brantly, 551 Military Trail, West Palm Beach 33404

DADE COUNTY 16 mm FILMS

THE PROTOZOANS

1. The Invertebrates
   AV#1-11145, 14'

2. Life in a Drop of Water
   AV# 1-02719, 10'

3. Protozoa
   AV#1-02171, 11'

4. Amoeba
   AV#1-02717, 10'

5. Micro-organisms Beneficial Activities
   AV#1-11358, 15'

6. Micro-organisms Harmful Activities
   AV#1-11360, 15'

7. Paramecium
   AV#1-02724, 10'

SPONGES AND COELENTERATES

8. Animals Without Backbones
   AV#1-02716, 11'

9. Sponges and Coelenterates
   AV#1-02172, 11'

THE WORMS

10. Regeneration
    AV#1-30607, 28'

11. Earthworm
    AV#1-02734, 10'

12. Earthworm
    AV#1-02735, 10'

FILMS (CONT.D)

MOLLUSKS AND ECHINODERMS

13. Molluska
AV#1-11149, 14'

14. Sea Urchin Repr.
AV#1-11055, 14'

THE ARTHROPODS

15. Arthropoda: Insects and their Relatives
AV#1-02736, 11'

16. Insect Life Cycle
AV#1-02787, 11'

17. Insects
AV#1-02760, 11'

18. Black Widow Spider
AV#1-02742, 12'

19. Arachnids
AV#1-02740, 10'

THE INSECTS

20. Orders of Insects
AV#1-30740, 30'

21. Metamorphosis
AV#1-30668, 28', AIBS

22. Ants
AV#1-02814, 10'

23. Housefly
AV#1-02789, 11'

24. Housefly and Its Control
AV#1-11168, 11'

FILMS (CONT'D)

25. Natural Enemies of Insect Pests
AV#1-30703, 27'

26. Termites
AV#1-11165

THE FISH

27. Biography of a Fish
AV#1-02827, 10'

28. Moon-tides and the Grunion Story
AV#1-11177, 15'

29. Fish are Interesting
AV#1-02826, 10'

30. Fish and their Characteristics
AV#1-02831, 11'

THE AMPHIBIANS

31. Frogs and Toads
AV#1-02849, 10'

32. Frog - Toad - Salamander
AV#1-02842

33. Salamander
AV#1-02854, 15'

34. Frog
AV#1-02845, 10'

35. Amphibians
AV#1-02824, 11'

36. Life Cycle of a Frog
AV#1-02852, 11'

FILMS (CONT'D)

37. Frog Anatomy
AV#1-11182, 17'

38. Life Cycle of a Frog
AV#1-02790, 11', B & W

THE REPTILES

39. Introducing the Reptiles
AV#1-11183, 17'

40. Reptile
AV#1-11186, 15'

41. Dinosaur
AV#1-30673, AIBS

42. From Water to Land
AV#1-30548, AIBS

43. Reptiles and their Characteristics
AV#1-02865, 11'

THE BIRDS

44. Bird Community
AV#1-02940, 12'

45. Birds of Florida Marsh
AV#1-11196, 12'

46. Nature's Birds of Prey
AV# 1-30710, 30'

47. Bird Control
AV#1-02898, 11'

48. Bird Migration
AV#1-02931, 10'

49. Chicken: Primitive Streak to Hatching
AV#1-11518, 13'

FILMS (CONT'D)

50. Birds and their Characteristics
AV#1-02892, 11'

51. Water Birds
AV#1-02995, 12'

MAMMALS

52. Big Animals of Africa
AV#1-02836, 11'

53. African Farms
AV#1-02660, 11'

54. Big Animals of N. America
AV#1-02283, 11'

55. Bear Country
AV#1-30699, 31'

56. Food Getting Among Animals
AV#1-11140, 13'

57. Ingestion and Digestion
AV#1-30439, 28'

FILM LOOPS

Available from Wards Natural Science Establishment
P. O. Box 1712, Rochester, New York

1. Sponges, 73 W 1901 (1 min. 28 sec.) 18.50
2. Hydra, 73 W 1902 (1 min. 52 sec.) 18.50
3. Sea Anemone, 73 W 1903 (2 min. 17 sec.) 18.50
4. Planaria, 73 W 1904 (2 min. 17 sec.) 18.50
5. Fluke, 73 W 1905 (1 min. 48 sec.) 18.50
6. Tapeworm, 73 W 1906 (4 min. 24 sec.) 18.50
7. Chitons, 73 W 1906 (1 min. 45 sec.) 18.50
8. Limpets, 73 W 1908 (1 min. 55 sec.) 18.50
9. Land Snail, 73 W 1909 (2 min. 26 sec.) 18.50
10. Clam, 73 W 1910 (2 min. 16 sec.) 18.50
11. Earthworm, 73 W 1916 (3 min. 8 sec.) 18.50
12. Tubifex Worm, 73 W 1917 (2 min. 37 sec.) 18.50
13. Leech, 73 W 1918 (2 min. 6 sec.) 18.50
14. Starfishes, 73 W 1919, (2 min. 41 sec.) 18.50
15. Sunflower Star, 73 W 1920 (1 min. 46 sec.) 18.50
16. Sand Dollar, 73 W 1921 (2 min. 21 sec.) 18.50
17. Sea Urchin, 73 W 1922 (3 min. 7 sec.) 18.50
18. Brittle Star, 73 W 1923, (1 min. 50 sec.) 18.50
19. Sea Cucumber, 73 W 1924 (3 min. 11 sec.) 18.50

FILM LOOPS (CONT'D)

20. Salmon Run, 73 W 1126 Standard 8mm , 18.00
73 W 6410 Super-8 21.50

21. Goddfish Eggs Hatching, 73 W 1127 Standard 8mm, 10.00
73 W 6311 Super-8, 13.50

22. Blood Circulation in a Goldfish Tail
73 W 1128 Standard 8mm, 10.00
73 W 6312 Super-8, 13.50

23. Courtship Ritual of Stickleback Fish
73 W 1129 Standard 8mm, 18.00
73 W 6313 Super-8 , 21.50

24. Sea Horse 73 W 1130 Standard 8mm, 15.50
73 W 6313 Super-8, 21.50

25. Lungfish and Other Australian Animals
73 W 1131 Standard 8mm, 17.00
73 W 6315 Super-8 , 20.50

26. Reptiles
Alligators - Birth and Survival
73 W 1134 Standard 8mm, 17.00
73 W 6316 Super-8, 20.50

27. Dinosaurs - Plant Eaters
73 W 1137 Standard 8mm, 17.00
73 W 6317 Super-8, 20.50

28. Dinosaurs,- Meat Eaters
73 W 1138 Standard 8mm, 17.00
73 W 6318 Super-8, 20.50

29. Marine Iguana of the Galapagos Islands
73 W 1141 Standard 8mm, 15.50
73 W 6329 Super-8, 20.50

30. Chameleon
73 W 1141 Standard 8mm, 15.50
73 W 6320 Super-8, 18.50

FILM LOOPS (CONT'D)

31. Desert Snakes
73 W 1142 Standard 8mm, 17.50
73 W 6321 Super-8, 18.50

32. Rattlesnake
73 W 1144 Standard 8mm, 17.00
73 W 6322 Super-8 , 20.50

BIO-PLASTIC MOUNTS

Available from Wards Natural Science Establishment P. O. Box 1712, Rochester, New York

1. Porifera, Scypha (Grantia) 55 W 0100, 3.00

2. Chalina (Finger Sponge) 55 W 0140, 4.25

3. Coelenterata, Obelia, 55 W 0250, 3.75

4. Physalia (Portuguese Man-of-War), 55 W 0300, 9.25

5. Polyorchis, 55 W 0320, 6.00

6. Gonionemus, 55 W 0340, 3.00

7. Aurelia (Common Jellyfish) 55 W 0350, 5.25

8. Metridium (Sea Anemone), 55 W 0400, 6.25

9. Comparative Teaching Collection of Corals, 55 W 0435, 8.75

10. Platyhelminthes, Planaria, 55 W 0510, 3.75

11. Fasciola Hepatica (Sheep Liver Fluke) 55 W 0520 4.25

12. Opisthorchis (Clonorchis) Sinensis (Oriental Liver Fluke) 55,W 0530, 4.25

13. Fasciolopsis Buski (Giant Fluke of Man) 55 W 0540 , 5.25

BIO-PLASTIC MOUNTS (CONT'D)

14. Taenia Pisiformis (Dog Tapeworm), 55 W 0550, 6.75

15. Dipylidium Caninum (Smooth Dog Tapeworm), 55 W 0560, 7.75

16. Nematoda, Ascaris (Roundworm of Pig) 55 W 0820, 5.25

DISCUSSION QUESTIONS

1. Predict the consequences of killing predators in a closed ecosystem.

2. Discuss the life cycle of parasitic worms and their effect on people. Include in the discussion means of control and eradication.

3. Discuss the effects of the introduction of an exotic life form into an ecosystem. An example of an exotic life form is the giant African snail or the Japanese beetle.

4. Debate the merits of South Florida Flood Control District in relation to the water supply in Everglades National Park.

5. What effects do the Everglades fires have on animal life?

ADDITIONAL INNOVATIVE ACTIVITIES

1. Make one or more of the following collections:
   A. South Florida Sea Shells
   B. South Florida Insects

2. Collect photographs or obtain drawings of the following:
   A South Florida Birds
   B. Everglades Life
   C. Endangered South Florida Wildlife

3. Set up and maintain a salt water aquarium showing various marine forms besides fish.

4. Set up and maintain either an ant colony or a termite colony.

5. Make notebooks or posters of helpful and harmful vertebrates or invertebrates.

6. Demonstrate or bring in one example of each of the following, all of which are available as live or preserved specimens:
   1. Protozoa
   2. Sponge
   3. Coelenterate
   4. Flatworm
   5. Roundworm
   6. Segmented worm
   7. Spiny skinned animal
   8. Shelled animal (mollusk)
   9. Joint-legged animal
   10. Fish
   11. Amphibian
   12. Reptile
   13. Bird (may be a visual)
   14. Mammal

NOTE: Students may be graded on the number demonstrated: D = 1-4, C = 5-7, B = 8-11, A = 12-14. This is a good teaching strategy on similar types of projects to get students involved such as parts of dissected animals identified, number of interrelationships of animals around school grounds, number of ways to preserve endangered species, etc.

REFERENCE TEXTS

1. Hegner, Robert Invertebrate Zoology. New York: MacMillian and Cowe, 1963.

2. Knut, Schmidt-Neilson Animal Physiology, 2d ed. New Jersey: Prentice-Hall, 1964.

3. Morholt, Brandwein, Joseph A Source Book of the Biological Sciences. New York: Harcourt, Brace & World, 1966.

4. Needham, James and Needham, Paul. A Guide to the Study of Fresh Water Biology. San Francisco: Holden-Day, Inc., 1967.

5. Storer, Tracy I. and Usinger, Robert L. General Zoology. New York: McGraw-Hill Book Co., Inc., 1957.

6. Weisz, Paul. Elements of Biology. New York: McGraw-Hill Book Co., 1965.

REFERENCES AND PAMPHLETS

1. Beakley, John, et al. The Source Book of Marine Sciences. Tallahassee: Florida State Department of Education, 1968.

2. Herald, Earl S. Living Fishes of the World. Garden City, New York: Doubleday & Co., 1961.

Made Simple Books. Available from Doubleday and Co. Garden City, New York

3. The Study of Birds Made Simple

4. The Study of Fish Made Simple

5. The Study of Reptiles Made Simple

REFERENCES AND PAMPHLETS (CONT'D)

Pamphlets available from: The Game and Freshwater Fish Commission, Tallahassee, Florida

6. Facts About Florida Bear

7. Facts About Florida Deer

8. Florida Animal Tracks

9. Snakes Can Kill

Pamphlets available from: The U. S. Department of Agriculture, 2690 Northwest 7 Avenue, Miami, Florida, 33127, or 18710 Southwest 288 Street, Homestead, Florida, Write or call and ask for publication list.

10. Making Land Produce Useful Wildlife, Farmers Bulletin #2035

11. Florida Pocket Gopher, Circular #310

12. Mole Control, Circular #248

13. Ants in the Home and Garden, Bulletin #28

14. Beetles in Your Pines, No.

15. Florida Beekeeping, Bulletin #10

16. The Tail of a Rat and Mouse, Circular #240

17. Screwworms and their Control, Circular #107

18. Household Insects and their Control, Entomology and Hematology #41

Audubon Nature Bulletins Available at $.20 each from: The Audubon Society, 1130 5th Avenue, New York, N.Y. 10028

19. Life in a Pond

20. Life in the Desert

REFERENCES AND PAMPHLETS (CONT'D)

21. Salt Marshes

22. The Forest Community

23. Let's Explore a Backyard

MASTER SHEET - [illegible] AND OTHERWISE

Objectives	References and Pamphlets	Experiments	Demonstrations	Projects	Reports	Field Trips	Speakers	Films	Film Loops	Slides	Additional Activities	References	Texts	Bio-Plastic Mounts
1	3,4,5	1,6,26, 35,36, 37		1,2, 5,6	2,5,6, 7,8	1,2,3, 4	1	1,2,9, 13,15, 18,32, 36,40, 41	1,2,3, 9,12, 14,30, 32		3	1, 4	3 Ch.4,5 5 Ch.13, 14,15, 16	1-3, 10,16
2	6,7,8, 10,11, 16	1,4,6, 21,22. 17,18, 35,36, 39,41, 42		1,2, 3,5, 6	5,7,8	1,2,3, 4	2	1,8, 11,12, 13,14, 15,21, 31,40, 44	1,2,3, 4		5	1	5 Ch.13, 14	
3	10	4,20, 25	1,2,3		1,5,7, 8	2	2, 3	17,26, 28,29, 51,45, 47	30		5	1,4	3 Ch.7,8, 9	
4	11,12, 16	14,30		3	3,5,7, 8	1,2	2,3	8,44, 46,47, 53	32		5	1,4	5 Ch.15, 16	
5	17,18	13,23, 26,31, 38		1,2	5,7,8	1,3,4	2,3	1,2,3, 4,5,6, 7,9, 19,23, 24,25	5,6,9, 10,11, 13	6,7,32 to 45	1,4,5	1,4	5 Ch.13, 14	ANY
6	19,20, 21,22	15	1,2,3			3	1,2,3	45,54, 55,57			2			
7	11,19, 20,21, 22	20,25		1	5,7,8	1,3	2,3	58,54, 55,32, 33,40	ANY		2	4	3 Ch.1,2, 9,20 8 Ch.29	1,2,3, 8
8	10,11, 16,18	9,10, 13,18, 29		1	8,7	1,3,4	2,3	3,13, 47	26	18 to 45	1,2		5 Ch.16, 20	7,8,9, 11,12, 13,16